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EXTENSION WORK IN AGRONOMY

1925

O. S. Fisher

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Extension Service Circular 18 July, 1926

EXTENSION WORK IN AGRONOMY, 1925

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Introduction

The outstanding phases of agronomy extension in crop improvement in 1925, as reported by agronomy specialists and directors of extension, were: (1) Seed improvement and standardization and (2) production of feed crops, especially legumes and improved pastures in connection with the improvement of the livestock industry. In soil improvement, outstanding work was done in increasing the use of (1) high-analysis fertilizers, (2) cover crops for green manuring, and (3) lime. Widespread interest was also manifested in the control of plant diseases and noxious weeds.

Seed Improvement and Standardization

In 42 States seed improvement and standardization were emphasized by agronomy specialists and county agricultural agents. Such work was of outstanding importance in all sections of the country and with all the major crops. Thirty-two States reported on the standardization and improvement of small grains; 34, on corn; 11, on potatoes; 8, on cotton; 4, on grass seeds; 4, on soybeans; and 1 each, on sorghums and rice.

During the year the general thought in the various States regarding objects of seed improvement and standardization of crops was clarified. In a majority of the States such work was carried on (1) to develop varieties of seed best adapted to the various sections of a State, (2) to standardize a few outstanding varieties to make possible a general seed-improvement project in the community and to simplify the problems of marketing the crop, (3) to develop local supplies of high-quality seed primarily for use in a seed-improvement program in the community and county rather than to

develop seed for outside marketing. Agronomy specialists are coming to realize that it is impossible to carry on an organized standardization program for crops except as they develop supplies of seed adapted to the various regions.

As indicated from the above, crop-standardization activities produced good results in almost all sections of the country. In the Northwestern States, seed improvement and standardization of small grains and grass were emphasized; in the Southern States, cotton and grain sorghums; in the Eastern and North Central States, small grains and corn; in the Southern States, cotton and soybeans; and in Louisiana, rice.

A good example of the results of crop standardization was reported by E. R. Jackman, farm crops specialist in Oregon, where five years' work in standardizing the wheat of eastern Oregon has resulted in entire counties with as high as 90 per cent of wheat acreage seeded to one variety. Mr. Jackman reported that a hard freeze in the winter of 1924 killed nearly all fall-seeded grain. This acreage would have been seeded to Federation or hard Federation wheat if enough seed had been available, as demonstrations have shown that these two wheat varieties yield from 4 to 10 bushels per acre more than other varieties. He reported that in 18 counties 171,400 acres of Federation wheat was seeded in 1925 and in 13 counties 172,250 acres of hard Federation wheat was seeded.

In a report from New Mexico, G. R. Quesenberry extension agronomist, pointed out that various sections of the State have definitely standardized the variety of corn to be grown. They have found, for example, that Mexican June corn gives the best results all through the Southern part of New Mexico. So far they have not been able to find any corn that will give as good results, and some excellent work is being done in improving the quality of the Mexican June type.

New Mexico and Arizona have made progress in standardizing and developing sources of seed for cotton production. Because of the danger of the introduction of pink bollworm a plan has been made for developing seed centers with the object of standardizing one variety of cotton of a high-producing strain and one that will produce a uniform quality and length of fibre, and for developing sources of good seed in local communities to safeguard their cotton-producing territory from infestation of the bollworm.

Reports indicate that in a number of communities enough seed of one variety and quality for entire gin areas for 1926 will be furnished.

Kansas held an intensive campaign on seed-wheat improvement during the last two weeks of July. Thirty-five counties were covered in the campaigns, and it is estimated that 117,000 people were present at the meetings. As a result of this work and the excellent foundation work carried on in previous years, 76,513 bushels of high-quality seed wheat free from rye were distributed and 13,150 bushels of certified seed were sold in the fall of 1925. This indicates that the farmers of Kansas are realizing the value of high-quality seed free from mixtures, and this work will go a long way toward standardizing wheat production in that State.

In Maine, as in a number of other States, potatoes are considered a field crop. Mr. A. K. Gardner, extension agronomist, who began work on improving seed potatoes in 1922, reported that approximately 65 per cent of the total potato acreage of the State was planted with improved seed in 1925. These examples illustrate the value of improved seed and the increase in the demand for improved seed of standard varieties which have been brought about through the efforts of the agronomy specialist.

Feed Crops

During 1925 the reports of specialists and directors of extension indicated that the improvement of feed crops was fully as important as seed improvement and standardization. It is coming to be a well-recognized fact that the livestock industry in different parts of the country can not develop as it should without adequate supplies of home-grown feed crops. As transportation improves and makes possible the quick and easy transportation of meat and dairy products, the various sections of the country are competing more and more with each other in the production of these necessities of life and the farmers are forced to give more attention to cutting down the cost of production and improving the quality, and one of the simplest and most effective ways of doing this is in the increased local production of feed.

In most sections of the country this refers primarily to production of legume hay crops and pasture improvement. One very effective plan for increased feed production was a series of combined dairy and feed schools carried on in Maryland and Massachusetts. In these States the dairy and crop specialists work together at the feed school, the dairy specialists bringing out the value of legume feeds in cutting down the cost of dairy production, and the agronomy specialist taking up as his part of the program the production of the different legumes most suited to the section in which the meeting is held. Statements from the extension directors in both States indicate that conducting these schools has been one of the most effective pieces of extension work they have ever carried on.

The reports of specialists and directors indicate that the feed-production phase of the agronomy program was of special importance in 44 of the 48 States. Special emphasis was given to the production of legume feed crops in 37 States, pasture improvement in 17 States, and general feed crops in 9 States.

Some of the States have made their legume feed crop work rather general, but alfalfa production has been outstanding in most of the States, with the production of sweet clover as a secondary feed crop in many of them. In some States, especially in the Eastern and Southern, soybean production for feed purposes has been the outstanding work carried on in feed production.

In the Eastern and Northeastern States, where a close balance exists between the cost of producing dairy products and the income from the sale of these products, feed production was of special importance. In Connecticut, for example, the ultimate goal for legume work is to produce a sufficient supply of clover and alfalfa hay to meet the livestock needs of the farmers. In developing this work, two important phases were kept continually in mind: (1) Obtaining limestone at reasonable prices, as it is impossible to grow legumes on acid soils without the use of lime; and (2) procuring a supply of seed of good quality and a variety that will withstand severe winters. It is interesting to note that more progress was made in the introduction of alfalfa than red clover because a more dependable source of alfalfa seed of the hardy varieties is available than of red clover. This work was carried on following a definitely outlined campaign in which the dairy specialist, farm management specialist, and agronomy specialist cooperated, and results indicate that progress was made in increasing the number of farmers growing alfalfa and enlarging the acreage on farms where this crop is already established.

New York reported that special alfalfa campaigns were carried on in eight counties during 1925. A special effort was made to reach every farmer who could reasonably be expected to profit by growing alfalfa and dairy feed. Usually if a farmer is interested his soil is examined to determine its physical structure and the amount of limestone needed to correct acidity. He is given specific instructions for preparing fields for seeding alfalfa, the kind of seed that he should use, and so forth. Although final results are not yet available, indications are that these campaigns will have the effect of increasing greatly the total alfalfa production in these counties.

The largest increase in alfalfa production during the past few years has been in the dairy sections of the North Central States. Like New England, the dairy farmers of Michigan, Wisconsin, and Minnesota, especially, have found that it is more profitable to grow legume feed on their own farms than to ship it from other sections. Michigan reported that special dairy and alfalfa campaigns

were carried on in 12 counties during 1925. Six of these were in counties where campaigns had been carried on previously and a second campaign was requested. Reports indicate that in these 12 counties 268 meetings were held with an attendance of 3,085, which resulted in an increase of 46,000 acres of alfalfa. The total reported for this State was 494,000 acres. Fifty-six counties in the State have carried on such campaigns in the last five years.

In Wisconsin, where intensive campaigns have been carried on for two years to increase the alfalfa hay acreage, 286,000 acres were reported grown in 1925, or an increase of 19,000 acres in spite of the loss by winterkilling of approximately 129,000 acres. They had expected to have in 1925 an increase of 150,000 acres over 1924, but it is an outstanding accomplishment that in spite of the tremendous loss from winterkilling, they are still able to show an increase in acreage. The report states that the hay protein feed problem is one of the most important in the State, and that approximately 2,000,000 acres of alfalfa hay will be needed to supply their tremendous dairy industry.

Pasture improvement is also important in many States. Ohio furnishes a good example of the value of this phase of the agronomy program. Their pasture-improvement program has been in operation for four or five years, and the 1925 report shows 319 demonstrations in operation in 47 counties. During the year, 71 tours and field meetings were held and pasture demonstrations attended by 805 farmers. These demonstrations show the value of applying limestone and acid phosphate to old hillside pastures. The material is usually applied without cultivation or additional grass seed, although in a few special cases, sweet clover or other grass seed is used. The value of this work is indicated in the report of a demonstration in Scioto County in which 12 acres in pasture were treated with lime and acid phosphate and 24 acres were left untreated. During the season from May 9 to November 4, the 12 acres of treated pasture produced 1,640 pounds of beef and the 24 acres of untreated pasture produced 1,421 pounds of beef, an increase of 130 per cent in the carrying capacity of the treated pasture. Not only did the treated pasture produce more pounds of beef but the cattle on this area were in better condition through the season than on the untreated pasture.

A number of States have conducted demonstrations showing the value of seeding sweet clover in old blue-grass pastures. The blue grass makes excellent pasture during the seasons of abundant moisture in the spring and fall but is practically worthless during the hot, dry months of the summer. A light seeding of sweet clover will materially increase the carrying capacity of many blue-grass pastures, especially during July, August, and September.

The sweet-clover work in Nebraska is a good example of the value of this crop in the Central States. The extension agronomist reported that in 1920, 30,000 acres of sweet clover were grown in Nebraska. The acreage increased steadily until in 1925 there were 245,994 acres. The largest increase occurred during 1925, when approximately 102,000 more acres were grown than in 1924.

The increase in sweet-clover acreage in Nebraska has been brought about largely through a definite campaign carried on in a number of counties. This campaign was called the "More Legume-Erosion" project. It was put on in four counties in 1924 and in eight additional counties in 1925. Excellent publicity was planned for the campaign, using the State farm papers and county weeklies. Four circular letters dealing with various phases of legume production and the effect of growing legumes on the control of erosion were also distributed to the farmers in January and February. In 1924, 10,050 letters were sent into four counties. One county received as high as 4,000 letters and another county as low as 950 letters, the difference depending upon the number of farmers in the county.

It has been very interesting to check the effect of these campaigns in the different counties. As a result of the campaigns in 1924 and 1925, the sweet-clover acreage in counties with county agents increased 118 per cent. In adjoining counties without county agents where no campaigns were put on, the increase was only 67 per cent. When we compare the increase in sweet-clover acreage in all counties in the State having county agents, which includes 31 counties where no legume campaigns were carried on and 12 counties where intensive campaigns were conducted, we find an increase of 109 per cent in sweet-clover acreage, whereas the increase in all counties of the State without county agents was only 87 per cent. These figures indicate the definite value of the county-agent work in putting over a program of this kind and bring out especially the value of intensive campaigns in influencing a much larger number of farmers. It would seem that much of the increase in the counties without county agents could be traced indirectly to the work of the extension service of the State, as many of these people, of course, read articles in the State papers as well as in many county papers and could not help but be influenced to some extent by the work being carried on in the 43 counties with county agents.

In the Southern States the program for diversification is limited to a very great extent by the feed problem. Soybeans are used extensively for hay production and during 1925 some especially outstanding work was carried on in a number of States. Definite progress is being made in the development of permanent pastures that will furnish an abundance of feed for at least nine months in the year.

In the Southern States pasture-improvement work furnishes an excellent example of the value of cooperation with commercical interests. Not only did local banks cooperate but in a number of States the railroads cooperated very closely with State and local extension workers in putting on this program. Many of the railroads financed the putting on of demonstrations and furnished their own field men to assist in conducting the demonstrations, procuring seed, putting up signs, and the like. Some of the railroads put out bulletins calling attention to the value of permanent pastures in increasing livestock production, and furnished definite information regarding the variety of pasture mixtures best adapted to various sections of their territory.

A number of grasses are used in developing permanent pastures in the Southern States. However, lespedeza, carpet grass, white clover, and Dallas grass are used as foundation pasture mixtures in most of the States. In some of the higher mountainous sections, blue grass and redtop are being used. In addition to these grasses, many of the Southern States are experimenting with various grass mixtures in an endeavor to improve permanent pasture work.

The extreme drought which lasted almost the entire growing season did a great deal of damage to pastures and other crops in the Piedmont sections of the Southern States, so that the amount of work done with feed crops and pastures was not so great in these States as it would have been under normal conditions.

A study of the reports indicates that pasture work has been done in practically all the old cotton States. In Virginia, in 1925, 50 pasture-improvement demonstrations were carried on in 14 counties, principally in the rougher, mountainous sections of northern and western Virginia.

S. J. Kirby, State club agent of North Carolina, reported that experiments in pasture improvement have been conducted since 1912 and that in 1925 experiments were conducted in 35 coastal-plain counties of the State, and 130 pasture demonstrations were conducted. These consisted of variety grass mixture, lime demonstrations, and fertilizer demonstrations.

In South Carolina, S. L. Jeffords, forage crops specialist, reported that pasture-improvement work has increased rapidly within the past three years. In 1924 1,104 pasture demonstrations were conducted, or an increase of 611 demonstrations over 1923. In 1925 it was planned to have at least 600 additional pasture demonstrations in operation, but the extremely dry season and the scarcity of carpet grass and lespedeza seed made it necessary to postpone many of these demonstrations. County agent reports indicate that 272 pasture demonstrations were completed involving a total of 6,389 acres. The demonstrations consisted of variety grass mixtures, fertilizer, and lime demonstrations. These figures would seem to

indicate that many pasture demonstrations are of considerable size and that they are having a very decided effect upon the pasture-improvement work in South Carolina. Mr. Jeffords is trying out a number of new grasses with the hope of finding some that will be an improvement.

In Georgia the goal for 1925 was 1,000 additional acres of permanent pasture, but reports indicate that 3,000 acres were grown. In addition to this work, a special alfalfa campaign was launched in a number of counties and it was hoped to get at least 2,000 acres of alfalfa in the fall of 1925. However, owing to the extremely dry weather only 500 acres were seeded.

In Tennessee work on the development of resistant red clover has been in progress for a number of years. The Tennessee Experiment Station has developed a strain of red clover that is apparently resistant to the various clover diseases that affect the clover crop in the Southern States. This clover, no doubt, will prove of great benefit in increasing the acreage of red clover in this section. The problem now is to procure a supply of seed in large enough quantities to make this work really valuable. Up to the present time the quantity of clover seed procured has not been great enough to put this work on a very broad basis.

Soybeans

Soybeans continue to be the outstanding annual legume crop for many sections of the Southern States. This will probably always be true, as soybeans can be grown with less expense than alfalfa and clover. During the past two or three years considerable progress has been made in developing varieties best suited to the sections, both for hay and grain production. R. W. Hamilton, legumes specialist in South Carolina, reported that the soybean crop increased from 40,000 acres in 1924 to more than 100,000 acres in 1925. The Otootan, Biloxi, and the Laredo are three of the best varieties for that State.

Early in the spring of 1925, Mr. Hamilton located sources of seed of these various varieties to supplement the local seed available from the 1924 crop. As seed was scarce the prices ranged from $8 to $12 per bushel. It was not long until outside seed firms were offering to deliver these varieties of seed in South Carolina at much cheaper prices than they were being offered through local dealers. Investigation disclosed that much of the seed was inferior and that the State was being flooded with seed unsuitable for South Carolina production.

A strenuous educational campaign was put on to bring to the attention of the people the facts that the college was recommending sources of good reliable seed of the varieties best suited to their sections and that much seed was being offered for sale in the State that was not of varieties as represented.

As a result of Mr. Hamilton's activities last spring and the need for better organized assistance in handling soybean work, the South Carolina Soybean Growers' Association was organized in 1925. Through the cooperation of this association and Mr. Hamilton, working with the Federal post office authorities, some of the men who were responsible for flooding South Carolina with misrepresented soybean seed were convicted and sentenced to prison. This should prove of great benefit in protecting not only South Carolina but other States from such reprehensible practices.

A number of other States in this section reported considerable acreages of soybeans. Maryland reported more than 30,000 acres grown almost entirely for hay purposes; Georgia reported approximately 100,000 acres in soybeans for hay purposes; and Arkansas reported that 3,473 farmers adopted new practices in the production of soybeans, although the acreage of this crop is not given. In all these States a large amount of money is ordinarily spent for the purchase of feed so that the increase in the use of soybeans will help in reducing this expense.

The Western States have the largest alfalfa acreages of any section of the country. Formerly much of this alfalfa was baled and shipped to the Central and Eastern States for dairy feed purposes. However, during the past few years, due to quarantines on interstate shipments, high freight rates, increase in feed production, and increased production of dairy products in the Western States, the growing of supplementary feed has become very important. This project is listed as a definite part of the Western States' program. In most sections of the West, the feed program is largely one of growing supplementary grain crops to balance the available alfalfa feed. However, in some States this program has become varied in order to meet the local conditions.

In Montana, for example, A. J. Ogaard, agronomy specialist, reported that the corn acreage has increased during the past few years to the extent that in 1924 more corn was produced than could be used until the alfalfa acreage was increased to balance it. The improvement of corn is being continued, however, especially by carrying on demonstrations to show the farmers the value of adapted varieties and through the Montana Crop Improvement Association supplies of seed of good varieties are being developed.

In Utah, where the most important work on the feed program has been in the improvement of the range pastures, many of these pastures because of overgrazing were becoming depleted, and very definite plans are being worked out for allowing the ranges, especially in the high mountainous sections where there is a reasonable amount of rainfall, to reseed themselves. This is done by means of restricted grazing regulations carried on largely by means of educational work with the people who own livestock and control the ranges.

In Idaho a large amount of corn is being produced to supplement the extensive alfalfa-hay production program. Many sections of Southern Idaho have developed a considerable amount of dairying, and the corn crop both for silage and grain is needed for this purpose. In addition to corn work, Idaho has been doing some interesting work in the development of Ladino clover for pasture purposes.

In Washington and Oregon the question of pasture improvement for the dairy industry of the western part of these States was important. Although this section usually has a heavy rainfall, the acreage of good pasture was not sufficient for supporting the dairy population. In addition, increased interest was manifested in the production of hardy alfalfa. E. R. Jackman, farm crops specialist of Oregon, reported 521 new demonstrations in the production of Grimm alfalfa in 21 counties in Oregon. The acreage in these 21 counties was 68,185.

In New Mexico G. R. Quesenberry is doing interesting work in feed production, both on dry land and irrigated sections of the State. The production of dry-land feed crops, especially of sorghums, is outstanding. The work done with club boys on the production of grain sorghums in Roosevelt County is an excellent example. Previous to 1925 a number of variety demonstrations were carried on until two varieties of grain sorghums were found satisfactory for that section. In 1925 demonstrations were put on with 125 club boys. Improved seed of the varieties recommended by the extension service was used. They are treating their grain sorghums with copper carbonate before seeding to control smut, and it is planned that each boy will save his seed from his club demonstration and use it for his own farm as well as his neighbor's. In this way, they are developing 125 local seed sources in this one county. Mr. Quesenberry estimates that a sufficient amount of certified Milo seed will be available for seeding the entire acreage in 1926.

In Colorado pasture improvement on irrigated and nonirrigated sections of the State has been in progress for a number of years. In the irrigated sections they are recommending a heavy seeding of what is known as Morton's Mixture. The principal grasses in this mixture are brome grass, orchard grass, meadow fescue, timothy, and sweet clover.

In the nonirrigated areas, with a rainfall of 18 inches or more, brome grass and sweet clover are being used, and in sections where the rainfall is lighter, rye and Sudan grass for temporary pasture are being used. Work is being done on high altitude legume feed crops, and either a mixture of oats and peas or peas with sweet clover as a forage and hay crop is used with excellent results. This crop for feed purposes has been grown at altitudes of more than 8,000 feet, which makes it possible to furnish excellent feed where normally ranchers depend on native grasses almost entirely.

Soil Improvement

Soil improvement is one of the most important phases of the agronomy project, and in most States it is fully as important as the question of good seed, standardization of crops, and the production of feed crops. Reports of agronomy specialists indicate that some phase of the soil-improvement program was given special emphasis in 33 States. The use of home-mixed and high-analysis fertilizers was emphasized in 14 States, general fertilizer improvement in 7 States, legumes and green manure in 14 States, and the development of the use of lime in 20 States.

High-Analysis Fertilizers

For four to five years a number of States have called attention to the value of using high-analysis fertilizers and home-mixed materials in order to decrease the cost of fertilizers used by the farmers. Fourteen States reported an increase in the use of high-analysis fertilizers in 1925, which indicates that good progress has been made on this project. The report from Missouri is a good example of this progress. In 1918, 55.8 per cent of all fertilizers sold in the State was of medium and low-grade goods. In 1925 this percentage had been reduced to 4.75, More striking still was the fact that in 1918 only 45.2 per cent of the fertilizers sold in Missouri was of grades recommended by the agricultural college, whereas in 1925, 95.25 per cent of all fertilizers sold was of grades formulated and recommended by the college and experiment station. This is a direct result of the policy on the part of the college and experiment station, working through the extension service, to bring before the farmers and the fertilizer salesmen the value of using high-analysis fertilizers as compared with low-analysis goods.

The plan followed in Ohio has been much the same as that in Missouri with practically the same results. The soils specialist's report from Ohio indicates that in 1920 a low-grade fertilizer (1-8-1) ranked second in the total tonnage of fertilizers sold. In 1924, this same fertilizer ranked 24th in the total amount sold. In 1922 only 40 per cent of the mixed fertilizer sold contained more than 14 per cent plant food, whereas in 1924, the amount of high-grade fertilizer sold had increased to 76 per cent. These two examples indicate very clearly the value of bringing to the attention of not only the farmers but the fertilizer trade itself the kind and quality of fertilizers that the experiment station will recommend.

The fertilizer work in Alabama is an excellent illustration of what can be done by cooperation between the experiment station and the extension service. In 1911 the Alabama Experiment Station studied the fertilizer needs of the various soil types, This has been continued and at the present time the fertilizer work in Alabama is based on what is known as the "Auburn method of fertilization." As it has been impossible to purchase mixed fertilizer

goods of the quality found to be most beneficial, the use of home-mixed material has been advocated. F. E. Boyd, agronomy specialist, reported that in 1925, 49.5 per cent of the total tonnage of fertilizers used in Alabama was home-mixed and 50.5 per cent factory mixed. He also points out the fact that home-mixed fertilizers have been purchased at a saving of $8.51 per ton over the average price for all fertilizers sold, thus saving approximately $2,500,00 to the farmers of Alabama. Their slogan is "home-mixed fertilizers in Alabama, they cost less and produce more."

This tremendous increase in the use of home-mixed fertilizers in Alabama during the past two or three years has been brought about through a series of intensive meetings and demonstrations to show to the farmers of the State the value of buying fertilizer ingredients of known quality and mixing them at home. In cooperation with the extension service in this educational campaign the State farm bureau federation has gone into the market and purchased fertilizers in car lots and boatloads, thus furnishing to the farmers fertilizer material at the lowest possible cost. This, together with the work Mr. Boyd has been doing on the use of vetch as a winter cover crop, has brought good results during the last two or three years. When Mr. Boyd began this work about 5 years ago he had 30 projects, but during the last three years his attention and energy have been centered on the two projects of fertilizing by the Auburn method and the use of vetch as a green-manure crop, and this plan has proved satisfactory.

Green Manuring

Fourteen States reported the use of cover crops of various kinds for green-manuring purposes. The work in Alabama is outstanding. Nitrogen is one of the elements of plant food most needed in soils for crop production, and one of the most expensive plant foods to purchase. By using hairy vetch as a winter legume for soil improvement, crop yields are increased at the minimum of expense. In 1918, 1,535 pounds of hairy-vetch seed were used in Alabama. This increased steadily until in 1925 633,079 pounds were used. Their results indicate that winter legume with acid phosphate furnished excellent combination for crop-improvement work. Some of the records indicate that yields are doubled by following this method of soil improvement.

In 1925 in Lee County, Ala., corn without vetch yielded 19 bushels per acre, whereas on an adjoining field where vetch had been plowed down corn yielded 40 bushels per acre. Another demonstrator reported that cotton grown on land with 200 pounds of low-grade commercial fertilizer yielded 1 bale on 8 acres and on the same farm where vetch and phosphate had been turned under 14 bales were grown on 17 acres. Another demonstrator reported that corn following rye yielded 12 bushels per acre, whereas corn following vetch yielded 29 bushels per acre. In addition to its value for soil improvement, vetch also furnishes a large amount of winter pasture for the dairy cattle of the State.

Another example of the value of legumes is in the tobacco-producing area of Tennessee where a definite campaign for the use of lime and clover for the production of quality tobacco has been put on. Tobacco grown on clover sod was found to be not only increased in yield but also markedly improved in quality. This campaign was carried on in 12 middle Tennessee counties, and as a result most of the farmers in a number of these counties are now planning to grow their tobacco on clover sod. The campaign was carried on through the joint efforts of A. B. Harmon, district agent for middle Tennessee and R. H. Milton, assistant agronomy specialist. They furnished a large number of news items to the two daily papers of Nashville which cover this territory, as well as to local papers. In all the correspondence with the farmers in that section they emphasized the value of "clover for tobacco." Meetings were arranged and carried out in all these counties; lime-grinding demonstrations were held, and a number of field meetings were conducted. One of the important features of the campaign was a lime-legume essay contest organized by Mr. Harmon. This contest was opened May 1 and ended July 1, and more than 1,000 farm boys and girls wrote essays on "Why Use Lime and Legumes in Middle Tennessee?"

Another feature of the campaign was a lime-clover farm tour held in Robertson County on May 29. Although this tour came at a very busy season of the year, 300 farmers from 11 middle Tennessee counties attended, some of them driving a distance of 150 miles. The commercial interests of Robertson County cooperated in furnishing automobiles and assisted in furnishing dinner to the people attending the tour. The entire day was spent in visiting farms on which lime and grown clover had been used, so the farmers could actually see the clover fields growing, talk to the farmers who had used clover for tobacco production the previous year, and find out the value of this plan in increasing the quality and quantity of their tobacco.

It may be stated that in middle Tennessee a goal was set of 32,850 tons of lime to be used for the lime and clover, but 38,584 tons were actually purchased and spread. Much of this lime was procured locally from lime outcrops, ground with portable crushers and hauled direct from the grinders to the farms, thus furnishing limestone to the farmers at the lowest possible cost.

Green-manure crops have been used in New Jersey for a number of years, especially where truck crops on the lighter types of soil are grown. The following will give some idea of the increase in acreage of green-manure crops in 1925 over 1924. In Salem County, the acreage increased from 315 in 1924 to 1,580 in 1925. In Gloucester County, 156 farmers reported a total of 2,735 acres of green-manure crops in 1925. Based on this statement the county agent estimated that 30,085 acres of green-manure crops were grown in the county in 1925. Middlesex County increased its acreage 61 per cent, or from 4,130 acres in 1924 to 6,680 in 1925. H. R. Cox, agronomy specialist, reported that a number of different methods,

including newspaper articles, posters, a series of 4 cards used in some counties, as well as general information in news articles showing the value of green manure in increasing crop production, were used to interest farmers in green-manure crops.

This type of soil-improvement work is not used so extensively in the newer States. However, in a number of sections, sweet clover is used as a green-manure crop with excellent results. Waldo Kidder, agronomy specialist of Colorado, indicated that where sweet clover is used as green manure there is an average increase of 3 to 6 tons of sugar beets per acre and with corn an increase of 8 to 10 bushels per acre. As a result the extension service in Colorado put on a special campaign in cooperation with the Great Western Sugar Company and the Burlington and Pacific Railroads to increase the use of sweet clover for green-manuring purposes in the sugar-beet-producing areas of that State.

Lime

Agronomy specialists in 20 States reported work with lime. As in previous years, much of this work was concerned with making the use of lime more easily available to the farmers at the lowest possible cost. However, the amount of lime used also increased materially in different States.

In Missouri the use of lime has increased from 10,000 tons in 1920 to 102,000 tons in 1925. F. C. Bauer of the Illinois State College of Agriculture has developed some very interesting plans for increasing the use of lime. He has divided the limestone-legume project into three phases; namely, soil testing, educational meetings, and field demonstrations.

The soil-testing phase of the program was developed in 1924; and project leaders have been carrying on the work. A county-wide meeting is held and one project leader from every community attends. These men spend a day in the soil-testing school, finding out how to take samples, how to make the soil tests, and the way to color field maps to correspond with the various tests. They then go from farm to farm in their own communities and test the soils. In this manner farmers attending the schools can make detailed tests of their own farms and maps showing the lime requirements for the different fields. This plan has been tried out in only a few counties but has been very successful.

Doctor Bauer also furnishes a chart showing the increase in the use of agricultural limestone from 1906 to 1925. This chart shows a steady increase except in the years 1919 to 1921 when there was a slight decrease. The quantity used has increased from 122 tons in 1906 to 113,000 tons in 1916, and 794,975 tons in 1925.

Griffith Richards, Associate Professor of Soils of the Wisconsin State College of Agriculture, stated that in 28 counties the county agents reported a total of 100,763 tons of different kinds of limestone used. In addition various commercial companies reported that their sales increased from 41,416 tons in 1924 to 50,144 tons in 1925.

The extension service of Indiana in cooperation with the B. & O. Railroad Co., conducted a soil-improvement special train, making 17 stops, attended by 465 farmers. These farmers brought samples of their soils to the train to be tested and through the cooperation of various lime companies 1,180 tons of limestone or 21 car lots were furnished free or enough to cover 1 acre with the amount of limestone that the tests indicated would be required to correct the acidity in the soil.

In Kentucky the use of marl for liming purposes is being developed. S. C. Jones, field agent in agronomy, reported that since the first discovery of marl for agricultural lime purposes September 20, 1923, 1,832 samples of marl have been collected and analyzed and that in 1924, 437 men in 24 counties used a total of 9,311 tons of marl, most of it coming from marl beds on their own farms or from the farms of neighbors.

In addition to the marl that is used, the county agents reported that 91,000 tons of ground limestone were used in the 60 counties in which they worked and that at least 120,000 tons of ground limestone were used in Kentucky in 1925.

In a number of other States they have continued to develop plans for furnishing limestone to the farmers more easily. In Michigan and parts of northern Indiana large deposits of marl in old lake beds have been found. The Michigan report for 1925 indicates that through the cooperation of the agronomy specialist and the farm engineering department, effective machinery has been developed for digging marl from old lake beds and that demonstrations have been held in a number of sections of the State. Michigan specialists reported that 31 marl-digging demonstrations were held in 16 counties with an attendance of 3,630 farmers. This work has been a definite part of the alfalfa and dairy campaign in Michigan, and has, without doubt, been a big factor in the large increase of alfalfa acreage in that State.

Crop-Disease Control

Disease-control work is, of course, closely connected with various phases of the crop-improvement program. In 1925, 19 agronomy specialists reported work on various phases of disease control. Fifteen of these are with smut control by the copper-carbonate treatment, all of them with wheat. In addition, in New Mexico, G. R. Quesenberry has been using the copper-carbonate treatment for smut control in grain sorghums with excellent results. Five States

reported work on corn diseases, principally with root-rot in the Middle West, and two States reported work on potato-disease control.

Weed Control

The control of noxious weeds is a serious problem in almost all States, especially in the irrigated sections of the Western States. The 1925 agronomy reports indicate that the weed-control project received attention in 9 States, and it was of enough importance to be included as part of the Western States extension program, at the recommendation of the agronomy committee at the conference held in Pullman, Wash., in November, 1925.

Conditions in Utah are typical of the seriousness of this problem and the attention it is receiving in the irrigated sections. J. C. Hogenson, the agronomy specialist, reported that wild morning-glory, whitetop, whirled milkweed, and Russian knap are weeds which are spreading in many parts of the State. In 1925, 36 method demonstrations and 93 result demonstrations were carried on in Utah and 507 farmers in 13 counties adopted improved practices in weed control. In 7 communities of Box Elder County, 70 farmers cooperated in keeping the roads free of weeds on 18 miles of highway, approximately 1,425 acres, 1½ miles of canal banks, and 4 miles of railroad right-of-way.

In North Dakota and parts of Minnesota the perennial sow thistle is a serious menace to agricultural crops, and definite campaigns for eradication and control of this weed have been under way in a number of counties in eastern and central North Dakota. Some of the older sections of these two States where the weed has been dangerous for a number of years have developed a system of farming which produces fair crops, and dairying and the production of feed crops are being emphasized, as farmers can not eradicate this weed entirely from their farms. Farmers in sections of the State where the sow thistle is beginning to make its appearance have been aroused and are making a definite stand in the hope of checking its advance.

In Kansas the bindweed is the greatest pest. In some sections of the State it has become so serious that it is affecting the price of agricultural land. The 1925 report of L. E. Willoughby, agronomy specialist, indicates that this weed has a foothold in practically every county in the State, although it is most serious in the central section. Demonstrations in the control of bindweed were started in 1923. In 1924 there were 59 demonstrations involving 1,650 acres; in 1925, this work had increased to 130 demonstrations on 1,844 acres. It is estimated that 137,250 acres are affected with this weed in Kansas alone. In addition to demonstrations showing the method of control by means of using salt, a large number of news letters, posters, and signs were put out,.

calling attention to the seriousness of the weed and the methods advocated by the extension service for its eradication. Farmers have been assisted in developing types of cultivators for clearing land of bindweed and also in getting the cooperation of the railroads in allowing a reduced rate on salt for the eradication of bindweed. Twelve carloads were used for this purpose in 1925.

Assistant Director Mercier of Louisiana reported that red rice and other weeds have become so serious that rice farmers are threatened with financial disaster. In eradicating the red rice from their fields they have adopted a two-year rotation, one year in soybeans and the next year in rice. In this way the fields can be given clean cultivation, and the weeds and rice killed, leaving the fields clean for a good crop of rice the following year. He states that 88 such demonstrations were put on with excellent results. Not only have the fields been cleaned of red rice and weeds but the result has been an average increase of 3.4 barrels of rice per acre which has given them a nice profit as well as a better quality of rice. The soybean crop will pay its own expenses in seed and feed, and the increased profit on the rice is clear gain.

Number of demonstrations and farms following practices in agronomy projects as reported in 1925 by all county agricultural agents

SOILS

Method demonstrations	33,311
Result demonstrations	66,394
Farms adopting improved commercial fertilizer practices	146,285
Tons of commercial fertilizers used	646,003
Farms taking better care of farm manure	36,566
Farms using lime or limestone for first time	43,939
Tons of lime or limestone used	1133,067
Farms plowing under green manure	28,216
Acres of green manure plowed under	328,531
Total number of farms adopting improved practices	252,041

CROPS

Item	Cereals					Potatoes	Cotton	Tobacco
	Corn	Wheat	Oats	Rye	Barley			
Method demonstrations.......	15,976	2,620	3,270	1,375	662	7,027	15,222	2,477
Result demonstrations.......	21,806	8,260	6,921	3,343	1,816	11,153	21,645	4,029
Acres involved..............	238,169	314,689	63,746	16,830	17,717	33,507	270,464	9,891
Farms planting improved seed for the first time.........	39,599	15,112	15,824	2,705	3,689	28,510	20,659	4,453
Farms treating seed for smut for the first time.........	2,455	15,149	7,849	230	1,269			
Farms adopting improved practices.................	90,241	39,576	30,713	5,139	6,442	68,584	79,890	16,220

Legumes

Item	Alfalfa	Soybeans	Sweet clover	Crimson clover	Clover (red, alsike, white)	Cowpeas	Velvet beans	Field beans	Peanuts	Lespedeza	Pastures
Method demonstrations.......	6,194	8,650	3,486	1,070	1,145	1,982	1,701	470	1,390	2,015	3,517
Result demonstrations.......	16,454	17,466	9,352	2,428	3,739	4,683	2,596	897	2,002	3,591	7,677
Acres involved..............	114,553	139,325	100,282	17,881	26,110	34,135	20,729	6,529	12,992	32,673	77,733
Farms planting improved seed for the first time.........	27,174	21,743	11,990	1,474	5,195	1,673	1,121	1,555	1,074	2,805	2,690
Farms adopting improved practices.................	51,804	48,134	28,848	4,122	10,998	8,305	5,404	3,274	4,478	6,739	12,512